

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) An illumination system comprising:

an arc tube including a light-emitting portion that emits light between electrodes and sealing portions that is arranged on both sides of the light-emitting portion;

a first reflecting mirror that is arranged on a rear side of the light-emitting portion along a longitudinal direction of the arc tube; and

a second reflecting mirror that is arranged on a front side of the light-emitting portion,

a diameter D_1 on a reflecting surface of the first reflecting mirror, indicated by an available marginal light emitted to the rear side from the light-emitting portion, being larger than a diameter d_1 of an outer surface of the second reflecting mirror, and the diameter d_1 of the outer surface of the second reflecting mirror being set to a size within the light of the available marginal light reflected by the first reflecting mirror;

a reflecting surface of the second reflecting mirror surrounding about half of the front side of the light-emitting portion and the light emitted from a center of the light-emitting portion and incident on the second reflecting mirror and a normal of the second reflecting mirror agree with each other; and

the reflecting surface of the second reflecting mirror being formed by face-grinding or press-molding a pipe having an inside diameter larger than the outside diameter of the sealing portion.

2. (Previously Presented) An illumination system, comprising:

an arc tube including a light-emitting portion that emits light between electrodes and sealing portions that is arranged on both sides of the light-emitting portion;

a first reflecting mirror that is arranged on the rear side of the light-emitting portion along a longitudinal direction of the arc tube; and

a second reflecting mirror that is arranged on a front side of the light-emitting portion,

a diameter D1 on a reflecting surface of the first reflecting mirror, indicated by an available marginal light emitted to a rear side from the light-emitting portion being larger than a diameter d1 of an outer surface of the second reflecting mirror, the diameter d1 of an outer surface of the second reflecting mirror being set to a size within the light of the available marginal light reflected by the first reflecting mirror, and the available marginal light being an inside boundary light of a range to be actually used as illuminating light;

the second reflecting mirror being arranged so that the light emitted from a center of the light-emitting portion and incident on the second reflecting mirror and a normal of the second reflecting mirror agree with each other; and

a diameter D2 at the opening end of the reflecting surface of the first reflecting mirror being within the range that satisfies $\theta_e > \theta_d$ when θ_d is approximated by:

$$\theta_d = 90^\circ + \tan^{-1} \left\{ (L_e/2 + L_r)/(d_2/2) \right\},$$

where L_e is a distance between ends of the electrodes, L_r is a distance on an optical axis of the illumination system from a center F_1 between the ends of the electrodes to an opening end of a reflecting surface of the second reflecting mirror, d_2 is a diameter of an opening end of the outer surface of the second reflecting mirror, D_2 is a diameter of an opening end of the reflecting surface of the first reflecting mirror, θ_d is an angle formed between the light emitted from an end of the electrode of the electrode ends adjacent to the first reflecting mirror without interception by the second reflecting mirror and a straight line of the optical axis of the illumination system extending toward the rear side of the

illumination system, and θ_e is an angle formed between a line connecting the opening end of the reflecting surface of the first reflecting mirror and an end of the electrode adjacent to the first reflecting mirror together and a straight line of the optical axis of the illumination system extending toward the rear side of the illumination system.

3. (Currently Amended) An illumination system, comprising:

an arc tube including a light-emitting portion that emits light between electrodes and sealing portions that is arranged on both sides of the light-emitting portion;

a first reflecting mirror that is arranged on the rear side of the light-emitting portion along a longitudinal direction of the arc tube; and

a second reflecting mirror that is arranged on a front side of the light-emitting portion,

a diameter D_1 on an opening end of a reflecting surface of the first reflecting mirror, indicated by an available marginal light emitted to a rear side from the light-emitting portion, being larger than a diameter d_1 of an outer surface of the second reflecting mirror, a diameter the diameter d_1 of an outer the outer surface of the second reflecting mirror being set to a size within the light of an available marginal light reflected by the first reflecting mirror, and the available marginal light being an inside boundary light of a range to be actually used as illuminating light;

the second reflecting mirror being arranged so that the light emitted from a center of the light-emitting portion and incident on the second reflecting mirror and a normal of the second reflecting mirror agree with each other; and

a diameter D_2 of an opening end of the reflecting surface of the first reflecting mirror having a size that allows reflection of a boundary light of the light emitted from an end of an arc generating between the electrodes adjacent to the first reflecting mirror without interception by the second reflecting mirror.

4. (Previously Presented) The illumination system according to claim 1, the available marginal light being marginal light determined depending on the structure of the arc tube.

5. (Previously Presented) The illumination system according to claim 1, the second reflecting mirror being arranged to an outer periphery of the light-emitting portion with a space therebetween.

6. (Previously Presented) The illumination system according to claim 1, the reflecting surface of the second reflecting mirror being formed of a dielectric multilayer that transmits ultraviolet light and infrared light.

7. (Canceled)

8. (Currently Amended) The illumination system according to claim 1, the outer surface of the second reflecting mirror being formed so as to allow the light incident ~~from the reflecting surface side of the second reflecting mirror thereon~~ to transmit.

9. (Currently Amended) The illumination system according to claim 1, the outer surface of the second reflecting mirror being formed so as to diffuse-reflect the light incident ~~from the reflecting surface side of the second reflecting mirror thereon~~.

10. (Previously Presented) The illumination system according to claim 1, the second reflecting mirror being made of any of quartz, light-transmissive alumina, crystal, sapphire, YAG, and fluorite.

11. (Previously Presented) The illumination system according to claim 1, an outer circumference of the light-emitting portion being coated with antireflection coating.

12. (Previously Presented) The illumination system according to claim 1, the second reflecting mirror being firmly fixed to a surface of a sealing portion in a vicinity of the light-emitting portion with an adhesive.

13. (Previously Presented) The illumination system according to claim 12, the adhesive being an inorganic adhesive containing a mixture of silica and alumina or aluminum nitride.

14. (Previously Presented) The illumination system according to claim 1, the second reflecting mirror being pressure-fixed to a vicinity of the light-emitting portion of the arc tube with a spring wound around an outer circumference of a sealing portion with a space therebetween.

15. (Previously Presented) The illumination system according to claim 14, the spring being formed of a conductive winding, one end of the conductive winding being connected to a lead wire extending from the sealing portion opposite to the spring.

16. (Previously Presented) A projector, comprising an illumination system and an optical modulator that modulates an incident light from the illumination system in accordance with given image information, the illumination system being the illumination system as recited in claim 1.

17. (Previously Presented) A method for manufacturing an illumination system, comprising:

an arc tube including a light-emitting portion that emits light between electrodes and sealing portions that is arranged on both sides of the light-emitting portion;

a first reflecting mirror that is arranged on a rear side of the light-emitting portion along a longitudinal direction of the arc tube and that serves as a main reflecting mirror; and

a second reflecting mirror that is arranged on a front side of the light-emitting portion and that serves as an auxiliary reflecting mirror,

the method comprising:

fixing the arc tube and the second reflecting mirror together, after adjusting a relative position between the second reflecting mirror and the arc tube such that real images of the electrodes or real image of an interelectrode arc of the arc tube overlap with the reflected images of the electrodes or the reflected image of the interelectrode arc reflected by the second reflecting mirror;

fixing the arc tube and the first reflecting mirror together, after arranging the arc tube and the first reflecting mirror such that a center of the electrodes of the arc tube having the second reflecting mirror fixed thereto substantially agrees with a first focus of the first reflecting mirror and adjusting a relative position between the arc tube and the first reflecting mirror so that a luminance of the first reflecting mirror is maximum in a specified position; and

fixing the arc tube and the second reflecting mirror together further comprising a process of detecting real image and reflected image from at least two directions by using a pickup image with a camera, adjusting the position of the second reflecting mirror so that the real image overlaps with the reflected image in each direction, and fixing the arc tube and the second reflecting mirror together.

18. (Canceled)

19. (Previously Presented) The method for manufacturing an illumination system according to claim 17, a specified position being a design beam-condensing spot of the first reflecting mirror; and the step of fixing the arc tube and the first reflecting mirror together including the process of fixing the arc tube and the first reflecting mirror together after adjusting the relative position between the arc tube and the first reflecting mirror so that the luminance in a vicinity of the design second focus of the first reflecting mirror is maximum.

20. (Previously Presented) The method for manufacturing an illumination system according to claim 17, a specified position being a position at which an illumination object of

an optical system that mounts the illumination system can be arranged; and the step of fixing the arc tube and the first reflecting mirror together including the process of fixing the arc tube and the first reflecting mirror together after incorporating the illumination system to the optical system and adjusting a relative position between the arc tube and the first reflecting mirror so that the luminance at the position in which the illumination object is arranged, becomes maximum.

21. (Previously Presented) The projector according to claim 16, the available marginal light being marginal light determined depending on the structure of the arc tube.

22. (Previously Presented) The projector according to claim 16, the second reflecting mirror being arranged to an outer periphery of the light-emitting portion with a space therebetween.

23. (Previously Presented) The projector according to claim 16, the reflecting surface of the second reflecting mirror being formed of a dielectric multilayer that transmits ultraviolet light and infrared light.

24. (Previously Presented) The projector according to claim 16, the reflecting surface of the second reflecting mirror being formed by face-grinding or press-molding a pipe having an inside diameter larger than the outside diameter of the sealing portion.

25. (Previously Presented) The projector according to claim 16, the outer surface of the second reflecting mirror being formed so as to allow the light incident from the reflecting surface side to transmit.

26. (Previously Presented) The projector according to claim 16, the outer surface of the second reflecting mirror being formed so as to diffuse-reflect the light incident from the reflecting surface side.

27. (Previously Presented) The projector according to claim 16, the second reflecting mirror being made of any of quartz, light-transmissive alumina, crystal, sapphire, YAG, and fluorite.

28. (Previously Presented) The projector according to claim 16, an outer circumference of the light-emitting portion being coated with antireflection coating.

29. (Previously Presented) The projector according to claim 16, the second reflecting mirror being firmly fixed to a surface of a sealing portion in a vicinity of the light-emitting portion with an adhesive.

30. (Previously Presented) The projector according to claim 29, the adhesive being an inorganic adhesive containing a mixture of silica and alumina or aluminum nitride.

31. (Previously Presented) The projector according to claim 16, the second reflecting mirror being pressure-fixed to a vicinity of the light-emitting portion of the arc tube with a spring wound around an outer circumference of a sealing portion with a space therebetween.

32. (Previously Presented) The projector according to claim 31, the spring being formed of a conductive winding, one end of the conductive winding being connected to a lead wire extending from the sealing portion opposite to the spring.

33. (Previously Presented) The projector according to claim 2, the available marginal light being marginal light determined depending on the structure of the arc tube.

34. (Previously Presented) The projector according to claim 2, the second reflecting mirror being arranged to an outer periphery of the light-emitting portion with a space therebetween.

35. (Previously Presented) The projector according to claim 2, the reflecting surface of the second reflecting mirror being formed of a dielectric multilayer that transmits ultraviolet light and infrared light.

36. (Previously Presented) The projector according to claim 2, the reflecting surface of the second reflecting mirror being formed by face-grinding or press-molding a pipe having an inside diameter larger than the outside diameter of the sealing portion.

37. (Currently Amended) The projector according to claim 2, the outer surface of the second reflecting mirror being formed so as to allow the light incident ~~from the reflecting surface side thereon~~ to transmit.

38. (Currently Amended) The projector according to claim 2, the outer surface of the second reflecting mirror being formed so as to diffuse-reflect the light incident ~~from the reflecting surface side thereon~~.

39. (Previously Presented) The projector according to claim 2, the second reflecting mirror being made of any of quartz, light-transmissive alumina, crystal, sapphire, YAG, and fluorite.

40. (Previously Presented) The projector according to claim 2, an outer circumference of the light-emitting portion being coated with antireflection coating.

41. (Previously Presented) The projector according to claim 2, the second reflecting mirror being firmly fixed to a surface of a sealing portion in a vicinity of the light-emitting portion with an adhesive.

42. (Previously Presented) The projector according to claim 41, the adhesive being an inorganic adhesive containing a mixture of silica and alumina or aluminum nitride.

43. (Previously Presented) The projector according to claim 2, the second reflecting mirror being pressure-fixed to a vicinity of the light-emitting portion of the arc tube with a spring wound around an outer circumference of a sealing portion with a space therebetween.

44. (Previously Presented) The projector according to claim 43, the spring being formed of a conductive winding, one end of the conductive winding being connected to a lead wire extending from the sealing portion opposite to the spring.

45. (Previously Presented) A projector, comprising an illumination system and an optical modulator that modulates an incident light from the illumination system in accordance with given image information, the illumination system being the illumination system as recited in claim 2.

46. (Previously Presented) The projector according to claim 45, the available marginal light being marginal light determined depending on the structure of the arc tube.

47. (Previously Presented) The projector according to claim 45, the second reflecting mirror being arranged to an outer periphery of the light-emitting portion with a space therebetween.

48. (Previously Presented) The projector according to claim 45, the reflecting surface of the second reflecting mirror being formed of a dielectric multilayer that transmits ultraviolet light and infrared light.

49. (Previously Presented) The projector according to claim 45, the reflecting surface of the second reflecting mirror being formed by face-grinding or press-molding a pipe having an inside diameter larger than the outside diameter of the sealing portion.

50. (Currently Amended) The projector according to claim 45, the outer surface of the second reflecting mirror being formed so as to allow the light incident ~~from the reflecting surface side thereon~~ to transmit.

51. (Currently Amended) The projector according to claim 45, the outer surface of the second reflecting mirror being formed so as to diffuse-reflect the light incident ~~from the reflecting surface side thereon~~.

52. (Previously Presented) The projector according to claim 45, the second reflecting mirror being made of any of quartz, light-transmissive alumina, crystal, sapphire, YAG, and fluorite.

53. (Previously Presented) The projector according to claim 45, an outer circumference of the light-emitting portion being coated with antireflection coating.

54. (Previously Presented) The projector according to claim 45, the second reflecting mirror being firmly fixed to a surface of a sealing portion in a vicinity of the light-emitting portion with an adhesive.

55. (Previously Presented) The projector according to claim 54, the adhesive being an inorganic adhesive containing a mixture of silica and alumina or aluminum nitride.

56. (Previously Presented) The projector according to claim 45, the second reflecting mirror being pressure-fixed to a vicinity of the light-emitting portion of the arc tube with a spring wound around an outer circumference of a sealing portion with a space therebetween.

57. (Previously Presented) The projector according to claim 56, the spring being formed of a conductive winding, one end of the conductive winding being connected to a lead wire extending from the sealing portion opposite to the spring.

58. (Previously Presented) The projector according to claim 3, the available marginal light being marginal light determined depending on the structure of the arc tube.

59. (Previously Presented) The projector according to claim 3, the second reflecting mirror being arranged to an outer periphery of the light-emitting portion with a space therebetween.

60. (Previously Presented) The projector according to claim 3, the reflecting surface of the second reflecting mirror being formed of a dielectric multilayer that transmits ultraviolet light and infrared light.

61. (Previously Presented) The projector according to claim 3, the reflecting surface of the second reflecting mirror being formed by face-grinding or press-molding a pipe having an inside diameter larger than the outside diameter of the sealing portion.

62. (Currently Amended) The projector according to claim 3, the outer surface of the second reflecting mirror being formed so as to allow the light incident ~~from the reflecting surface side thereon~~ to transmit.

63. (Currently Amended) The projector according to claim 3, the outer surface of the second reflecting mirror being formed so as to diffuse-reflect the light incident ~~from the reflecting surface side thereon~~.

64. (Previously Presented) The projector according to claim 3, the second reflecting mirror being made of any of quartz, light-transmissive alumina, crystal, sapphire, YAG, and fluorite.

65. (Previously Presented) The projector according to claim 3, an outer circumference of the light-emitting portion being coated with antireflection coating.

66. (Previously Presented) The projector according to claim 3, the second reflecting mirror being firmly fixed to a surface of a sealing portion in a vicinity of the light-emitting portion with an adhesive.

67. (Previously Presented) The projector according to claim 66, the adhesive being an inorganic adhesive containing a mixture of silica and alumina or aluminum nitride.

68. (Previously Presented) The projector according to claim 3, the second reflecting mirror being pressure-fixed to a vicinity of the light-emitting portion of the arc tube with a spring wound around an outer circumference of a sealing portion with a space therebetween.

69. (Previously Presented) The projector according to claim 68, the spring being formed of a conductive winding, one end of the conductive winding being connected to a lead wire extending from the sealing portion opposite to the spring.

70. (Previously Presented) A projector, comprising an illumination system and an optical modulator that modulates an incident light from the illumination system in accordance with given image information, the illumination system being the illumination system as recited in claim 8.

71. (Previously Presented) The projector according to claim 70, the available marginal light being marginal light determined depending on the structure of the arc tube.

72. (Previously Presented) The projector according to claim 70, the second reflecting mirror being arranged to an outer periphery of the light-emitting portion with a space therebetween.

73. (Previously Presented) The projector according to claim 70, the reflecting surface of the second reflecting mirror being formed of a dielectric multilayer that transmits ultraviolet light and infrared light.

74. (Previously Presented) The projector according to claim 70, the reflecting surface of the second reflecting mirror being formed by face-grinding or press-molding a pipe having an inside diameter larger than the outside diameter of the sealing portion.

75. (Currently Amended) The projector according to claim 70, the outer surface of the second reflecting mirror being formed so as to allow the light incident ~~from the reflecting surface side thereon~~ to transmit.

76. (Currently Amended) The projector according to claim 70, the outer surface of the second reflecting mirror being formed so as to diffuse-reflect the light incident ~~from the reflecting surface side thereon~~.

77. (Previously Presented) The projector according to claim 70, the second reflecting mirror being made of any of quartz, light-transmissive alumina, crystal, sapphire, YAG, and fluorite.

78. (Previously Presented) The projector according to claim 70, an outer circumference of the light-emitting portion being coated with antireflection coating.

79. (Previously Presented) The projector according to claim 70, the second reflecting mirror being firmly fixed to a surface of a sealing portion in a vicinity of the light-emitting portion with an adhesive.

80. (Previously Presented) The projector according to claim 79, the adhesive being an inorganic adhesive containing a mixture of silica and alumina or aluminum nitride.

81. (Previously Presented) The projector according to claim 70, the second reflecting mirror being pressure-fixed to a vicinity of the light-emitting portion of the arc tube with a spring wound around an outer circumference of a sealing portion with a space therebetween.

82. (Previously Presented) The projector according to claim 81, the spring being formed of a conductive winding, one end of the conductive winding being connected to a lead wire extending from the sealing portion opposite to the spring.